

# DRAFT

## Site Management and Monitoring Plan for the San Juan Harbor, Puerto Rico

### Dredged Material Site

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## 1. Background

Section 506 of the Water Resources and Development Act (WRDA) of 1992, which amended the Marine Protection, Research, and Sanctuaries Act of 1972 (MPRSA), requires the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) to prepare a Site Management and Monitoring Plan (SMMP) for each ocean dredged material disposal site. For sites designated prior to January 1, 1995, such as the San Juan Site (SJS), WRDA provides that SMMPs shall be developed by January 1, 1997. Further permitting of projects for disposal at ocean sites not having SMMPs after that date was prohibited until an SMMP was prepared.

This document constitutes the WRDA-required SMMP for the final-designated (40 CFR 228.15 (d) (6)) San Juan Harbor, Puerto Rico Dredged Material Site (SJS); prepared by USEPA Region 2 (EPA-2) and USACE Jacksonville District (USACE-JD). This SMMP identifies a number of actions, provisions, and practices to manage operational aspects of dredging and disposal activities and to perform site monitoring at the SJS.

### 1.1 History of the San Juan Harbor, Puerto Rico Dredged Material Site

Prior to 1974, all dredged material (except for Bar Channel material) taken from San Juan Harbor and its vicinity was placed in upland disposal areas. In 1974, these areas were exhausted and no new upland site could be obtained for dredged material disposal. Since 1975, all dredged material from San Juan Harbor has been disposed offshore.

The SJS was designated as an Interim Ocean Dredged Material Disposal Site in 1977 under MPRSA. In March 1988, the SJS was designated as a Final Ocean Dredged Material Disposal Site to receive materials from the San Juan Harbor area.

### 1.2. SJS Boundaries

The SJS is an approximately 1 square nautical mile area located approximately 2.2 nautical miles north-northwest of the entrance to San Juan Harbor positioned in a rectangle bounded by the following coordinates:

Degrees, Minutes, Seconds	Degrees, Minutes (decimal)
18° 30' 10" N 66° 09' 31" W	18° 30.17' N 66° 09.52' W
18° 30' 10" N 66° 08' 29" W	18° 30.17' N 66° 08.48' W
18° 31' 10" N 66° 08' 29" W	18° 31.17' N 66° 08.48' W
18° 31' 10" N 66° 09' 31" W	18° 31.17' N 66° 09.52' W

### 1.3 History of Enforcement Activities at the SJS

Since the SJS was designated, no significant violations and/or enforcement actions have been taken (i.e. actions resulting in fines and/or criminal proceedings). However, both EPA-2 and the USACE-JD have taken corrective actions to bring specific disposal projects into compliance with permit conditions.

EPA-2 and the USACE-JD have used the experiences of these instances to modify the existing guidelines for disposal of dredged material at the SJS and to ensure that future dredged material disposal takes place in accordance/compliance with applicable permit or contract conditions.

### 1.4 Transportation and Disposal Methods Used at the SJS

Dredged material disposed at the SJS has historically been removed from project areas using both hopper dredges and clamshell or other dredges. Although no specific dredging or disposal technique is required for this site, specific disposal instructions or requirements for each dredged material disposal project will be contained in the Department of the Army (DA) permit issued by the USACE-JD or in the contract specifications prepared for federal projects (see Section 10 of this SMMP).

## **2. Regulatory/Statutory Responsibilities Under MPRSA**

USACE and EPA have been assigned various duties pertaining to ocean disposal site management under MPRSA. EPA and USACE share responsibility for MPRSA permitting and ocean disposal site designation and management, as briefly summarized below.

### 2.1. Section 102 of the MPRSA

Under Section 102, EPA designates recommended times and locations for material disposed at ocean sites (including dredged material) and develops the environmental criteria used in reviewing permit applications.

## 2.2. Section 103 of the MPRSA

Under Section 103, USACE is assigned regulatory responsibility for transportation and disposal of dredged material, subject to EPA review and concurrence that the material meets applicable ocean disposal criteria. Applicants and USACE are required to use EPA-designated disposal sites to the maximum extent practicable for ocean disposing of dredged material.

## **3. Dredged Material Testing Requirements**

As part of the permitting process, applicants are required to test/characterize all dredged material proposed for disposal at SJS to determine if it meets the ocean disposal criteria (i.e. is suitable for ocean disposal). Dredged material testing procedures/requirements (including quality assurance requirements) are contained in the following documents:

- Ocean Dumping Regulations (40 CFR Part 227, "Criteria for the Evaluation of Permit Applications for Ocean Dumping of Materials")
- EPA/USACE 1991. "Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual" as amended (otherwise known as the 'Green Book').
- EPA Region 4/USACE-JD 1992 (or most recent revision). "Guidance for Performing Tests on Dredged Material proposed for Ocean Disposal" (otherwise known as the Regional Testing Manual).

EPA Region 2 and USACE-JD will prepare a regional implementation manual that provides guidance specific to ocean disposal of dredged material at the SJS and other ocean sites in the Caribbean region. Until this guidance manual is prepared and approved, however, the EPA Region 4/USACE-JD (1992) will be used to evaluate the suitability of dredged material proposed for disposal at the SJS.

The suitability of dredged material for ocean disposal must be determined by the USACE-JD and concurred with by EPA Region 2 prior to each authorization. The determination of suitability will be valid for three years from the time of testing, unless it is determined that conditions at the dredging site may have changed significantly since that time (e.g. chemical spills). EPA Region 2 may extend the authorization for an additional two years without further testing if: 1) conditions at the dredging site are deemed to not have changed significantly since the time of testing (reduced levels of testing effort may, in fact, be required to confirm this); and 2) no adverse impact have occurred or are expected at the dredging and disposal sites.

## **4. Anticipated SJS Use and Quantity of Material to be Disposed**

MPRSA 102 (c)(3)(D and E) requires that the SMMP include consideration of the quantity of material to be disposed of at the site, and the presence, nature, and

bioavailability of contaminants in the material, as well as the anticipated use of the site over the long-term.

The following table reports volumes that are anticipated by the USACE-JD for dredging and disposal at the SJS in FY99-FY01.

Completion Date	Type of Action	Volume (c.y.)	Composition
FY99	Maintenance/Deepening	3,700,000	silty sand, fines
FY2000	Maintenance/Deepening	3,700,000	silty sand, fines
FY2001	Maintenance/Deepening	1,000,000	silty sand, fines

The only source of material that is expected to be placed at the site during the projected period is maintenance and deepening material from areas of San Juan Harbor. Ongoing Federal projects include the Rio Puerto Nuevo Flood Control and the San Juan Harbor Widening and Deepening Projects. Materials will consist of variable percentages of silt, clay, and sand. There are no proposed limitations on the quantity of material that may be placed at the site.

## 5. Inter-Agency Coordination

### 5.1. Transfer of Information

EPA Region 2 and the USACE-JD jointly manage the San Juan Harbor dredged material disposal program and the SJS. EPA Region 2 and the USACE-JD will continue to coordinate the exchange of information, SJS management and monitoring resources, and the documentation of site management decisions. EPA Region 2 and USACE-JD will continue to provide each other with all pertinent data and information as it becomes available. Any information concerning disposal or dredging violations will be shared between the two agencies upon discovery and/or notification of the violations.

This SMMP constitutes an official agreement between EPA Region 2 and USACE-JD to continue to cooperatively manage and monitor the SJS and to coordinate the collection and transfer of information pertinent to the management and monitoring of the SJS as set forth herein.

### 5.2. Funding of SMMP Tasks and Activities

The costs of site management and monitoring will be shared between EPA Region 2 and the USACE-JD to the extent allowed by funding levels in any given fiscal year (i.e. cost-sharing will be subject to appropriations).

## 6. Objectives of the SMMP

The objectives of this SMMP are to:

- a. provide that no significant adverse environmental impacts occur from the disposal of dredged material at the SJS;
- b. recognize and correct any potential unacceptable conditions before they cause any significant adverse impacts to the marine environment or present a navigational hazard to commercial waterborne vessel traffic;
- c. determine and enforce compliance with ocean disposal permit conditions;
- d. provide a baseline assessment of conditions at the SJS;
- e. outline a program for monitoring the SJS;
- f. describe special management conditions/practices to be implemented at the SJS;
- g. estimate the quantity of material to be disposed at the SJS, considering the presence, nature, and bioavailability of the contaminants in the dredged material;
- h. specify the intended use and possible closure date, if necessary, of the SJS;
- i. provide a schedule for review and revision of the SJS SMMP.

## **7. Site Description/Assessment of Baseline Conditions at SJS**

MPRSA 102 (c)(3)(A) requires that the SMMP include a baseline assessment of conditions at the site. Baseline conditions measured by IE Corporation in 1980 were summarized in the Environmental Impact Statement prepared to support designation of the SJS (EPA, 1982). Additional baseline biological, geological and geochemical data was collected from the SJS in 1984 by JRB Associates (under contract to EPA). In November/December 1996 EPA Region 2 collected sidescan sonar, sediment chemistry, and benthic community structure data in and around the SJS to augment the baseline assessment of conditions at the SJS. The data from the 1996 survey will be incorporated into the baseline assessment as it becomes available. Further efforts will be made to enhance our knowledge of baseline conditions during monitoring operations at the SJS.

### **7.1. Physical, Meteorological and Oceanographic Features of the SJS:**

- a. Water depths at the SJS average 292 m (965 ft). Bottom depths at the southern boundary are approximately 213 m (700 ft) and slope moderately to approximately 400 m (1300 ft) at the northern boundary (EPA, 1982).
- b. Easterly trade winds predominate at the SJS throughout the entire year, primarily from the ENE direction. Wind speeds in the area are moderate. The mean annual wind speed is 14.2 km/hr, but shows considerable daily and monthly variation. Maximum wind speeds occur in July (mean monthly velocity = 16.1 km/hr) and minimum wind speeds generally occur in October (11.3 km/hr). Infrequent tropical storms and hurricanes are sometimes severe, occur any time from August to October, and generally produce considerable rainfall.

- c. Currents at the SJS are greatly influenced by the direction and strength of the trade winds. The trades blow primarily from the northeast, which in conjunction with the east-west alignment of the coastline results in a westerly, alongshore current. Surface currents show general westward drift (mean speed 0.6 knots) with a significant tidal component. Subsurface currents are not well defined, but appear to be weak. This fact is also evidenced by the relatively undisturbed depositional environment within the SJS and surrounding area.
- d. Water column structure at the SJS is more or less uniform throughout the year. Salinity and temperature data reveal the existence of a well-mixed layer of surface water. The depth of this surface layer varies with season from less than 30 m (April - December) to deeper than 100 m (varies from 100 to 330 ft). The average annual temperature and salinity of this surface water range between 26-28 °C and 35.5 - 36.2 ppt. Below this surface layer, a permanent density gradient (pycnocline) extends to approximately 240 m.
- e. Measurements of baseline dissolved oxygen, total suspended solids, and turbidity levels in the water column at the SJS were generally within ranges typically associated with unpolluted tropical conditions. Surface to bottom dissolved oxygen concentrations range from 7.3 to 5.4 mg/l, decreasing with depth below the pycnocline. Total suspended solids concentrations measured at the SJS ranged from below detection limits to approximately 1.8 mg/l. Turbidity at the SJS ranged from 0.15 - 0.59 NTU. Suspended solids and turbidity tend to be high in surface waters due to phytoplankton production, increase to a localized maximum near the pycnocline and decrease significantly at depth.

## 7.2 Sediment Composition/Chemistry and Benthos at the SJS

- a. *Sedimentary Composition:* The SJS is located over the insular northern Puerto Rican slope. Bottom sediments at the SJS are relatively heterogeneous: sediments are predominantly fine-grained (i.e. silts and clays) with localized sand and gravel areas. Samples of bottom sediments taken from the site the SJS average 48% silt and 45% clay. Side-scan sonar imaging conducted in 1996 revealed the presence of debris and active venting of biogenic gases over limited portions of the site.
- b. *Sediment Chemistry:* As described above, sediments at the SJS are predominately fine-grained. The total organic carbon content (TOC) of SJS sediments ranges from 0.5% to 2.3%. Sediment samples collected in 1984 from within and outside the boundaries of the SJS were analyzed for concentrations of trace metals, hydrocarbons and chlorinated organic contaminants (i.e. PCBs and selected pesticides). Analysis of sediment samples for hydrocarbons and chlorinated organics, from a station at the center of the SJS, indicated the presence of variable levels of well-weathered petroleum and biogenic hydrocarbons. Low levels of PCBs were also detected. Pesticides were not detected in the samples. All sediment samples were analyzed for trace metal levels; the results are reported in Table 1. Concentrations of certain metals (chromium, copper, iron, nickel, and zinc) were found to be somewhat elevated



at 2 stations within the SJS. However, trace metal concentrations at the remaining survey stations were not particularly high and within expected ranges for areas receiving some degree of anthropogenic input. Metals levels did not differ significantly between stations taken inside and outside of SJS boundaries.

- c. *Benthic Biota*: Benthic samples taken from the vicinity of the SJS yield low but highly variable numbers of taxa and individuals. The benthic community is characteristic of fine-grained bottoms, i.e. the community was dominated by deposit-feeding organisms. Numerically dominant taxa in the study area include polychaetes (197 taxa), crustaceans (97 taxa) and molluscs (60 taxa, primarily gastropods (snails) and pelecypods (bivalves)), echinoderms (19 taxa), and 25 minor taxa (primarily sipunculids, but also including phoronids, pogonophorans and cephalochordates). Significant differences in community composition between areas within and outside the SJS have not been detected and the diversity and abundance of organisms are positively correlated with increasing heterogeneity of the bottom sediment.

### 7.3. Usage of SJS by Fish, Marine Mammals and Endangered Species:

- a. *Marine mammals and sensitive species*: The SJS does not encompass any known breeding, feeding, or nursery areas of marine mammals, sea turtles or birds. Waters off San Juan are regularly visited during the winter months (January-mid-March) by migrating Humpback whales (*Megaptera novaeangliae*). Humpbacks do not feed while in tropical waters, but are often seen spy-hopping and engaging in other social display behaviors. Newborn calves may accompany female whales, since both Silver Bank (off N. coast of Hispaniola) and Mona Island (W. of Puerto Rico) are known calving grounds for this species. Whales can pass within less than 1 mile of shore, but are also observed further offshore. Dolphins are common residents and may be present in waters of the SJS at any time. West Indian manatees have been sighted in shallower waters both east and west of San Juan Harbor. Four species of sea turtles are also known to inhabit Puerto Rican waters. Juvenile green and hawksbill turtles may be found off the north shore of Puerto Rico, associated with rafts of *Sargassum*. Waters of the SJS are too deep to provide foraging habitat for adults of green, hawksbill or loggerhead turtles. Leatherback marine turtles approach the north shore of Puerto Rico during their nesting season (March-June) and may be present in offshore waters during this time, but basically spend the rest of their adult lives in the temperate zone. The endangered brown pelican is resident to Puerto Rico, but is primarily present inshore.
- b. *Fish*: Open waters of SJS may be feeding grounds for pelagic fish (e.g. tuna, jacks, mackerel) and deeper site waters may be feeding areas for various snappers and other species, but the SJS is not a critical area in this regard. Deep waters of the site may be inhabited by various species having wide depth ranges (e.g. elasmobranchs, conger eels, batfishes) as well as slope species (e.g. grenadiers).

A modest, but significant, commercial pot fishery operates out of San Juan. This fishery, however, is restricted to shallower, inshore shelf waters. Mackerel, sardine, snook and snappers constitute the bulk of landings in this fishery. A hand line fishery targeting snappers also operates out of San Juan; this fishery operates primarily in shallower water but extends to depths of approximately 600 ft. In addition, there are numerous private recreational and deep sea charter fishing operations centered at San Juan. Effort is generally directed at billfish, tuna, and other pelagics in this fishery.

**Table 1. Ranges of concentrations of selected contaminants in sediment samples taken from the SJS and its vicinity (JRB, 1984).**

Parameter (# of stations, observations)	Unit	Concentration, dry wt.
<b>Total PCBs</b> (1, in tripl.)	ng/g (ppb)	<87 - 1580 (Aroclor 1260)
<b>Arsenic</b> (18 stns; 38 obs.)	µg/g (ppm)	ND - 84.7
<b>Cadmium</b> (18 stns; 38 obs.)	µg/g (ppm)	0.04 - 1.32
<b>Chromium</b> (18 stns; 38 obs.)	µg/g (ppm)	5.6 - 95.8
<b>Copper</b> (18 stns; 38 obs.)	µg/g (ppm)	2.3 - 122
<b>Mercury</b> (18 stns; 38 obs.)	µg/g (ppm)	0.008 - 1.34
<b>Nickel</b> (18 stns; 38 obs.)	µg/g (ppm)	2.1 - 48.1
<b>Lead</b> (18 stns; 38 obs.)	µg/g (ppm)	0.4 - 129.6
<b>Zinc</b> (18 stns; 38 obs.)	µg/g (ppm)	3.0 - 331

## 8. SJS Monitoring Program

MPRSA 102 (c)(3)(B) requires that the SMMP for a given dredged material ocean disposal site include a program for monitoring the site.

EPA Region 2/USACE-JD have developed a tiered monitoring approach, similar in breadth and scope to the USACE New England Division's Disposal Area Monitoring System (DAMOS). DAMOS is a regional program to investigate the physical, biological, and chemical impacts of ocean disposal of dredged material at sites in the northeast. EPA Region 2/USACE-JD's Ocean Disposal Site Monitoring Program (MP) addresses both regulatory and technical issues associated with the disposal of dredged material at the SJS. The tiered approach described herein is comprised of levels of increasing investigative intensity designed to generate the technical information necessary to properly manage the disposal site in an environmentally-sound and cost-effective manner.

Monitoring intensity and frequency under the SJS MP is dependent upon volume and frequency of disposal. In general, if no significant annual disposal occurs, then no annual monitoring will be required. Inversely, projects requiring disposal of significant volumes of dredged material may also require specific monitoring.

### 8.1 Goals of the SJS MP

The SJS MP will focus on the overall impacts of dredged material on the entire SJS and surrounding area. In addition to addressing the Null Hypotheses ( $H_0$ ) (see Section 8.2), the overall goals of the SJSMP are to:

- a. continue to verify that dredged material disposed at the SJS does not cause any significant, unacceptable adverse impacts.
- b. continue to assess and monitor (trends) conditions at the SJS as defined in 40 CFR Section 228.10, and compare them to baseline data.

8.2 Questions/Null Hypotheses ( $H_0$ ) to be addressed by the SJS MP:

The SJS MP will focus specifically on verifying the following four null hypotheses ( $H_0$ ) for individual projects and/or disposal locations:

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$H_{01}$ : Dredged material disposal operations are consistent with the requirements of the ocean dumping permits.

Actions:

- Utilize the USACE-certified disposal inspector reports and information submitted by permittees to determine compliance.
  - Deploy GPS-based automated disposal surveillance systems with all disposals.
  - Conduct independent surveillance of disposal operations
- 

$H_{02}$ : Dredged material disposal operations are not causing significant unacceptable impacts (physical, chemical, biological) at the SJS and surrounding area.

Actions:

- Conduct sediment profile imagery surveys (Tier 2) at the SJS and surrounding area.
  - Conduct benthic community structure, sediment chemistry and body burden analyses within the SJS when deemed necessary based on results of Tier 2 physical and biological efforts
- 

$H_{03}$ : Dredged material disposal has no significant impact on endangered species.

Actions:

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- Review USACE-certified disposal inspector reports to ensure that no dredged material disposal occurs in the presence of any marine mammals/endangered turtles.
- Monitor marine mammals/sea turtle sightings, landings (bycatch), and strandings in the San Juan vicinity.

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H<sub>0</sub>4: Dredged material disposal does not significantly alter the benthic community structure of the area of the SJS.

Actions:

- Use sediment profile imaging (SPI) photography to assess sediment and benthos distribution.
- Conduct Tier 3 benthic community structure monitoring in and around the site

## **9. Monitoring Activities/Techniques**

### 9.1 Work/Quality Assurance Plan

The SJS MP consists of a three-tiered approach to monitor the physical, chemical and biological effects of dredged material disposed at the SJS, the components of these tiers are outlined below in Sections 9.2 to 9.4. Information from these monitoring activities will be extremely important for determining the potential for significant adverse impacts to occur due to disposal of dredged material at the SJS. For this reason, the data obtained in these surveys must be of high quality. All monitoring work conducted in accordance with this SMMP must conform to a work/quality assurance project plan (W/QAPP) that has been reviewed and approved by USACE-JD and EPA Region 2.

### 9.2 Physical Monitoring

Physical monitoring is designed to determine the physical nature and distribution of dredged material during and after disposal at the SJS and environs. Measurements of the physical nature of the material proposed for disposal at the SJS will allow first order tracking of physical impacts at the site and support modeling of initial mixing and seafloor deposition following disposal. Sediment profile imaging (SPI) will be used to confirm the fate of the material following disposal. SPI technology consists of a frame-mounted apparatus that enables a camera to take a picture of the sediment-water interface. Useful information can be obtained from the pictures to produce fine scale description of the spread of material on the bottom and its effect on the environment. Under certain circumstances, the collection and analysis of sediment samples may be required to fully assess the final disposition of dredged material discharged at the SJS.

#### *a. Tier 1: Dredged Material Testing/Modeling of Disposal Events/Disposal Inspection:*

Grain size distribution, percent moisture and total organic content of proposed materials will be measured for all dredged materials proposed for disposal at the site. This data is acquired in support of the evaluation of dredged material proposed for ocean disposal, as required by the 1991 Green Book and the regional implementation manual governing disposal at the SJS.

Disposals will be modeled using MDFATE and/or STFATE to estimate the footprint and plume anticipated to result from disposal of a proposed project prior to commencement of disposal at the site. Results will be used to determine disposal locations at the SJS.

ADISS-type (automated disposal inspector surveillance system) technology will be used to ascertain that loading and disposal of dredged material is occurring at authorized locations and that material is not being lost en route to the site. This technology simultaneously records the draft and position of the vessel to which it is attached and relays that data via satellite. The ability of ADISS to detect losses of dredged material while underway, however, is hampered under rough sea conditions and therefore visual inspection on all scows will also be required until the technology is refined to compensate for sea state.

Frequency: Conducted with every project.

*b. Tier 2: Sediment profile imagery (SPI):*

Sediment profile imagery (SPI) cameras will be deployed at an array of stations extending radially outward from the center of the SJS to define the footprint of dredged material within and around the site. Sampling locations will be determined jointly by EPA Region 2 and USACE-JD prior to the surveys. Because SPI has not yet been conducted at the site, the optimal length and spacing of radial transects will be determined from the first survey. From these images, grain size, sediment color and roughness can be determined and used to identify and map dredged material on the bottom. (Images obtained using SPI will also be used in Tier 2 biological evaluation of the site.)

Frequency: At least every 5 million cy, or if modeling predicts exceedance of site boundary. USACE-JD and EPA Region 2 will generally conduct these investigations, however the agencies may require surveys to be conducted by permittees (or by the USACE-JD) following disposal of large volume projects.

\*\*\*Note: The results of SPI will be used to adjust the Tier 1 model, as necessary\*\*\*

*c. Tier 3: Sediment sampling and analysis:*

In cases where additional information is required to refine the final disposition of discharged dredged materials, it may be required to actually collect sediment samples from within the SJS and its vicinity for analysis. Box core sediment samples will be collected from areas of interest inside and/or outside the site. Grain size distribution, percent moisture and total organic content of sediment samples will be analyzed. Tier 3

physical monitoring may be conducted alone or in conjunction with Tier 2/3 chemical (bulk sediment chemistry/body burden analyses) or Tier 3 biological efforts (benthic community analyses). Samples of the sediment will be collected using appropriate methods to allow for Tier 2 chemical analysis (bulk sediment chemistry). Organisms screened from the sediment will be preserved and archived in a manner that allows Tier 3 biological (benthic community analysis) and/or chemical analyses (body burden analysis).

Frequency: The need for and the areal extent of Tier 3 physical monitoring efforts will be determined by Tier 2 physical and biological evaluations ( i.e. SPI). In addition, Tier 2 monitoring may require confirmation/validation using box core samples.

\*\*\*Note: Sediment samples can also be used to assist in the interpretation of SPI imagery through examination of features present in the sample\*\*\*

*d. Special Studies (Physical):*

In the event that high resolution of site bathymetry is required, a survey using mid-water multibeam sounding equipment will be conducted at the site. This type of technology is required for obtaining bathymetry at the SJS because of the great depth of the water. However, owing to the high cost of this type of surveying and the expectation that accretion of deposited sediments will not result in seafloor features (this expectation is based on the results of monitoring of a deepwater dredged material ocean disposal site off San Francisco, CA) it is envisioned that bathymetric surveys of the SJS will not be conducted on a regular basis.

In the event that areas that warrant additional concern are identified in the vicinity of the site, arrays of sediment traps may be deployed along the margins of the site and the vicinity of the transport. Sediment traps can determine if significant quantities of dredged material are being transported off the site in the direction of the resource. (The traps would have to be deployed for approximately six months of active disposal and would be compared to sedimentation rates at a reference site, i.e. an area that is within the area of influence of hydrographic regimes affecting the SJS but that is unaffected by dredged material disposal). It is not envisioned that sediment traps will need to be deployed on a regular basis.

Additional studies and technologies may be used as required to address specific data needs but are not intended for application on a routine basis. Examples include sub-bottom profiling and side-scan sonar technologies.

Frequency: As needed

9.3. Biological Monitoring

The review of 96-h exposures of sensitive marine organisms to the suspended and liquid phases, and 10-d exposures to the solid phase of dredged material, prior to



approval for disposal at SJS, provides assurances that no acute toxicity will result from disposal of dredged materials at the SJS. Determination of long term trends in the benthic community, however will require SPI photography or collection and analysis of benthic samples. SPI photography provides useful information on the abundances, taxa, and successional stage of communities present at a given location without the expense of sampling. Under certain circumstances, actual sampling and analysis of benthic communities in and around the SJS may be required.

*a. Tier 1: Review of Testing Results/Monitoring for Sensitive and Fisheries Species Impacts:* Toxicity of all project material proposed for ocean disposal will be assessed using sensitive marine organisms and the procedures outlined in the 1991 Green Book and the regional implementation manual governing disposal at the SJS. The results of toxicity tests will be used in conjunction with the STFATE mixing model to ensure that disposal of the project material does not result in violations of the initial mixing requirements following disposal at the SJS. By prohibiting materials that show acute toxicity in 10-d tests from disposal at the SJS, the first level of assurance that adverse impacts to the benthos or to other marine organisms are not occurring due to the disposal of dredged material is gained. The results of bulk sediment and bioaccumulation tests will be used by USACE-JD and EPA Region 2 to identify and track impacted zones and direct biological sampling efforts at the higher monitoring tiers. Impacts to sensitive species (e.g. marine mammals, sea turtles, brown pelicans) will be avoided or minimized through the use of on board observers; disposal will not be allowed to occur in the presence of identified sensitive species. Fisheries issues are re-evaluated for the SJS during each permit/authorization process. (Impacts to fisheries due to disposal operations are not anticipated, however in the event that issues regarding fisheries are raised to the USACE-JD and/or EPA Region 2, the agencies will consult with resource authorities at NMFS, USFWS and the Commonwealth of Puerto Rico to review the issues in the context of dredged material disposal at the SJS.)

*b. Tier 2: Sediment profile imagery (SPI):*

SPI cameras will be used to identify and describe colonization and succession status of communities inside and outside site (SPI also serves as Tier 2 physical monitoring). If, based on comparisons with a reference site, areas outside the site appear to be biologically impacted by disposal activities then the areal extent of impact will be considered in the decision to pursue higher tier testing involving box core sampling (Tier 2 Chemical, Tier 3 Physical/ Chemical/ Biological) and may result in conditions placed on permits or contract specifications.

Frequency: At least every 5 million cy, or if modeling predicts exceedance of site boundary

*c. Tier 3: Benthic sampling and analysis:*

Tier 3 biological monitoring entails counting and identifying benthic organisms collected with box cores to define the status and health of the benthic community (e.g. species

identification, diversity, biomass, trophic status, successional stage). Identification of organisms will be to lowest practicable taxonomic unit. Sampling of benthos will occur in a stratified, random design to allow quantitative analysis of results; the sampling area may include all or part of the SJS, the surroundings and a reference area geographically removed from the effect of dredged material disposal at the SJS.

Frequency: Impacts within the site are expected due to the disturbances caused by disposal events. Impacts outside the site, or an absence of progress in the succession or in colonization of the site for extended periods of time after cessation of disposal, may be cause for concern and therefore prompt more definitive study in higher tiers of investigation (i.e. Tier 3 biological, Tiers 2/3 chemical). These indications would be detected using SPI in Tier 2.

\*\*\* Note: Tier 3 biological monitoring results will also be used to assist in the future interpretation of features present in SPI imagery\*\*\*

*d. Special Studies (Biological):*

In the event that concerns regarding local populations of fish or other species (e.g. crustacean macrofauna or sensitive species) are identified, standardized quantitative surveys and/or body burden surveys may be required. These surveys would use appropriate gear for capturing the target species (e.g. benthic sleds or trawls) and again use a reference area for comparisons.

Frequency: As needed

9.4. Chemical Monitoring

Chemical analyses of sediments and tissues of organisms exposed to the material proposed for ocean disposal enables USACE-JD and EPA Region 2 to assess the presence, nature and bioavailability of contaminants in dredged material prior to authorizing disposal at the SJS. Periodic collection and analysis of sediment and resident organism tissue samples from the SJS and its environs will provide USACE-JD and EPA Region 2 with information necessary to confirm that no significant adverse effects are occurring and to identify long term trends in and around the SJS.

*a. Tier 1: Review of ocean disposal testing results:*

Bulk sediment chemistry (and a measure of its bioavailability through biological tests) of proposed dredged material will be determined using the procedures outlined in the 1991 Green Book and the regional implementation manual governing disposal at the SJS prior to commencement of any disposal of the material at the site.

ADISS technology will be used to ascertain that loading and disposal of dredged material is occurring at the authorized locations and that material is not being lost en route to the site. Visual inspectors will also be deployed.



Frequency: Conducted with every project.

*b. Tier 2: Bulk sediment chemical analysis:*

Bulk sediment chemistry will be conducted on surface samples collected from the SJS and its environs. This data will be used to help determine the areal extent and distribution of dredged material and specific contaminants. Depending on site management data needs, the list of contaminants for a given effort may include all contaminants of concern or a few contaminants selected for their usefulness as tracers of dredged material or for their ecological significance. All sediment samples collected for bulk chemistry analysis will also be analyzed for grain size and total organic carbon content (Tier 3 Physical Monitoring). Modeling of the theoretical bioaccumulation potential of non-polar organic contaminants will be used to estimate bioavailability and to determine whether there is a potential for bioaccumulation of these contaminants to unacceptable levels and need for body burden analyses.

Frequency: The need for Tier 2 chemical monitoring will be determined from the results of SPI conducted under Tier 2 biological and physical monitoring. Possible triggers include observations that dredged material appears to have spread significantly outside the site or if SPI imagery suggests that colonization/succession is not occurring at rates comparable to reference sites. It is anticipated that these analyses will be conducted at least once every 10 million cubic yards.

*c. Tier 3: Analysis of body burdens of contaminants in benthic organisms:*

Conduct tissue chemical analysis of organisms from box core samples collected during Tier 3 Physical/Biological Monitoring. The species selected for body burden analyses will reflect their abundances in collected samples. The substrate in which collected organisms were residing will also be sampled and analyzed [Tier 2 chemical analyses (bulk sediment chemistry) and Tier 3 physical analyses (grain size/TOC/percent moisture)] and tissue lipid levels will be analyzed, to the maximum extent practicable. Ideally, Tier 3 chemical monitoring will also be conducted synoptically with an evaluation of the health of the benthic community (Tier 3, biological monitoring).

Frequency: Tier 3 chemical evaluation will be conducted if TBP modeling using Tier 2 (bulk sediment) chemistry results suggests that there is the potential for unacceptable bioaccumulation of contaminants from the dredged material or if sediment levels exceed reference concentrations by an order of magnitude.

\*\*\* Note: The results of Tier 3 analysis will be used (in conjunction with Tier 2 chemical (bulk sediment chemistry) and Tier 3 physical results (TOC)) to refine the inputs used in future TBP modeling\*\*\*

9.5 Frequency of Monitoring/Need for Higher Tier Investigations:

Monitoring at Tier 1 will be conducted prior to disposal of each authorized project. An anticipated schedule for monitoring is listed in Box 1, however if results indicate the need for further investigations, any required monitoring (Tiers 2 and 3) will be initiated. Specific circumstances that "trigger" advancing to higher tiers of monitoring will be decided by EPA Region 2 and the USACE-JD, with the assistance of an interagency SMMP team consisting of representatives of EPA Region 2, USACE-JD, the Commonwealth of Puerto Rico and other stakeholders. The SMMP team will evaluate existing monitoring data, anticipated or proposed disposals (including consideration of the type and quantity of anticipated material), and other relevant factors to determine appropriate monitoring and management preferences. The actual frequencies and schedules for all jointly-funded monitoring will be by mutual agreement of USACE-JD and EPA Region 2.

#### 9.6. Monitoring Data Management: Processing, Evaluation and Interpretation

- a. Data collected from SJS surveys are to be processed and analyzed by (or as specified by) the USACE-JD, EPA Region 2 (or their respective contractors). These data are used to make management decisions regarding dredged material disposal operations and permit decisions and must therefore be of reliable quality and in a consistent format.
- b. EPA Region 2 requires data to be in the National Ocean Data Center (NODC) format, where appropriate. Survey data will be provided to members of the SMMP team in a report generated by the action agency. The report will indicate how the survey related to the SMMP and to previous SJS surveys. Reports should be provided within 90 days after completion. Exception to the time limit will be possible if outside contracts stipulate a longer period of time. The report will provide data interpretations, conclusions, and recommendations, and will identify needs and projected goals of the next phase of the SMMP.
- c. Data collected will be made available to Federal and Commonwealth agencies and other stakeholders, as appropriate. Reports summarizing data will also be made available.

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#### **Box 1: SJS Monitoring Activities and Frequencies**

<b>Tier 1</b> - Monitoring activities will be conducted with each authorized project, as noted in text
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**Tier 2**

<b>Tier 2 - Monitoring Activity</b>	Anticipated Frequency	Triggered by...	Responsible Entity
Physical- SPI photography	every 5 MCY	Volume	USACE-JD/EPA Region 2, or permittee
Biological- SPI photography	every 5 MCY	Usage	USACE-JD/EPA Region 2
Chemical- SJS Sediments	every 10 MCY	Tier 2 Physical and Biological	USACE-JD/EPA Region 2

**Tier 3**

<b>Tier 3 - Monitoring Activity</b>	Anticipated Frequency	Triggered by...	Responsible Entity
Physical-Sediment Analyses	every 10 MCY	Volume, Usage	USACE-JD/EPA Region 2,
Chemical- Benthic Tissue	as needed	Tier 2 Chemical and Biological	USACE-JD/EPA Region 2
Biological- Community Analysis	as needed	Tier 2 Chemical and Biological	USACE-JD/EPA Region 2

**Special Studies**

**Special Studies** will be performed when deemed necessary to confirm that adverse effects are not occurring or to address any identified deficiencies in comprehension of baseline.

**10. SJS Disposal Permit Conditions/Enforcement**

MPRSA 102 (c)(3)(C) requires that the SMMP include special management conditions or practices to be implemented at the site that are necessary for the protection of the environment.

At present, no disposal restrictions related to seasonal variations in ocean current or biotic activity have been determined to be necessary for SJS disposal. Should any such restrictions appear necessary as monitoring results are compiled, they will be incorporated into future ocean disposal authorizations. Additionally, if new information indicates that endangered or threatened species are being adversely impacted, restrictions will be implemented.

### 10.1. Regulatory Framework: Permit Conditions

Disposal of dredged material at ocean disposal sites cannot occur without a Department of the Army (DA) permit (or without the MPRSA Section 103 (e) equivalent for Federal projects). DA permits for disposal of dredged material at the SJS are issued by USACE-JD and are valid for a period of three years. Copies of the issued permits and any letters modifying these permits may be obtained from the USACE-JD.

In cases where permits are not issued, as is the case with Federal navigation projects, requirements similar to permit conditions will be incorporated into the dredging contract specifications (see MPRSA Section 103 (e)). When USACE vessels, or their contractors, conduct the dredging, they will comply with the same requirements, monitoring, and safeguards that are included in permits issued to third party contractors. Permit-like instructions specifying all requirements are to be contained within the work specifications/orders for all projects. These conditions are equivalent to permit conditions and will be enforceable on the contractor under applicable law.

*a) General Conditions:* General permit restrictions consist generally of standard maritime industry and U.S. Coast Guard requirements.

*b) Special/Specific Conditions:* Special and/or specific permit restrictions will be listed in the text of the permit and will include, but not necessarily be limited to:

- Seasonal restrictions or special conditions regarding dredging and disposal (assigned on a case by case basis);

- Requirements for submission and format requirements of monthly transportation and disposal logs and volume summary sheets;

### 10.2. Violation/Enforcement Cases

a. Dredging or disposal at the SJS is to occur only with prior USACE-JD and EPA Region 2 approval. Projects not in compliance with the DA permit will be subject to enforcement action.

b. If any action takes place which does not conform to authorized dredging and disposal activities described in the permit (contract specification/work order for Federal projects), reauthorization, response letter, or other communicated requirements/restrictions, the Antilles Regulatory Section of the USACE-JD must be notified immediately. In cases where activities beyond the scope of those authorized occur, appropriate action will be determined by the Antilles Regulatory Section, in coordination with EPA Region 2.

c. If dredged material regulated by a specific DA permit issued by the USACE-JD or Federal authorization is discharged due to an emergency situation in order to safeguard life or property at sea in locations or in a manner not in accordance with the terms or conditions of the permit or authorization, the master/operator of the towing vessel and/or

the USACE-certified disposal inspector shall immediately notify the USACE-JD by marine VHF or cellular telephone, as required by permit. The USACE-JD shall copy EPA Region 2 on such notification the next business day. In addition, both the towing contractor and the USACE-certified disposal inspector shall make a full report of the incident to the USACE-JD and EPA Region 2 within ten (10) days. The report should contain factual statements detailing the events of the emergency and an explanation of the actions that were ultimately taken.

### 10.3. Site Inspection/Surveillance

a. To ensure compliance with the DA permit conditions and Federal authorization, routine observations of dredging activities in the San Juan Harbor area are performed by the USACE-JD.

b. USACE-JD and EPA Region 2 (and/or their designated representatives), reserve all rights under applicable law to free and unlimited access to and/or inspection of:

-the dredging project site (including the dredge plant, towing vessel and scow) at any time during the project;

-any equipment used for towing, surveying, monitoring or navigation;

-any and all records pertaining to specific (Federal or non-Federal) dredging and disposal projects including logs, reports, memoranda, notes, etc.

c. For all disposal activities, the dredging contractor will be required to prepare and operate under an approved electronic verification plan for all disposal operations. As part of this plan, the contractor will provide an automated system that will continuously track the horizontal location and draft condition (vertical) of the disposal vessel from the point of dredging to the disposal area, and return to the point of dredging.

## **11. Disposal Reporting Requirements and Data Management**

### 11.1. USCG Reporting Requirements:

The dredging/towing contractor must notify the Captain of the Port (COTP) of San Juan/USCG for a reference number before each vessel departs the dredging site for the SJS. Every trip made under the permit authorization is required to be recorded and endorsed by the master of the tow or the person acting in such a capacity.

### 11.2. Record Keeping/Documentation/Data Reporting:

a. Navigation logs will be maintained for each vessel (tugboat/barge) utilized for ocean disposal of dredged material. These logs should include the method of positioning (e.g. RADAR, LORAN-C, GPS, D-GPS, Dead Reckoning, other), accuracy, calibration methods, any problems and actions taken. EPA Region 2 and the USACE-JD

recommend that each tugboat/barge utilized for the ocean disposal of dredged material utilize D-GPS for navigation purposes.

b. Disposal logs must be maintained for each vessel that includes all information listed below. The user of the SJS will be required to prepare and submit to the USACE-JD daily reports of operations and a monthly report of operations for each month or partial month's work.

Daily reports must include the following data:

- (a) Date/Time;
- (b) Vessel name;
- (c) Dump number;
- (d) Map number on which dump is plotted;
- (e) Beginning and ending coordinates of the dredging area for each load, and the beginning and ending coordinates and the compass heading at the beginning of each dump;
- (f) Shoal number from which dredged material came; and
- (g) volume and brief description of material disposed.

### 11.3 Federal SJS Data Management and Reporting:

A spreadsheet file containing contractor-reported scow volumes information is maintained by the USACE-JD. All disposal records and submitted monthly disposal volumes for each project are proofread, verified and any discrepancies are corrected before entry of data into this spreadsheet. On a yearly basis, USACE-JD will compile all dredging, disposal and testing data and submit them to USACE Headquarters.

All dredged material disposal data submitted to USACE-JD will be compiled, analyzed and evaluated in a final end-of-the-year report that will be provided to EPA Region 2 during the first quarter of each calendar year and/or upon request.

The data file maintained by USACE-JD contains information pertaining to the following:

- Permit/Federal Project number
- Permittee or Federal Project name
- Waterway/Reach/Channel
- Was the project maintenance or improvement?
- Disposal area/buoy at which the material was released/discharged
- Disposal activity commencement and completion dates
- Volume of material disposed

- The year-to-date volumes of private (non-federal) and federal navigation projects disposed at the SJS, noted separately and collectively

## **12. SJS SMMP Review and Revision**

MPRSA 102 (c)(3)(F) requires that the SMMP include a schedule for review and revision of the SMMP which shall not be reviewed and revised less frequently than 10 years after adoption of the plan, and every 10 years thereafter.

A need for modification of the use of the SJS because of unacceptable impacts is not anticipated due to the management and monitoring outlined in this SMMP. However, should the results of monitoring surveys indicate that continuing use of the SJS will lead to unacceptable impacts, then the SJS SMMP will incorporate further restrictions/revisions to alleviate the impacts. The SMMP will be reviewed annually, in conjunction with monitoring data, by the interagency SMMP team to identify necessary revisions for management of the SJS.

## **13. References**

EPA. 1982. Environmental Impact Statement (EIS) for the San Juan Harbor, Puerto Rico Dredged Material Disposal Site Designation. Prepared by EPA, HQ. December 1982.

JRB Associates. 1984. Studies and Sample Analyses For San Juan, Puerto Rico Dredged Material Disposal Site. Report prepared under contract to U.S. Environmental Protection Agency, HQ. Contract No. 68-0106388, Work Assignment #63. September 1984.

Battelle Ocean Sciences. 1997. Survey Report for Oceanographic Survey of the Five Puerto Rico Dredged Material Ocean Disposal Sites. Report prepared under Contract to U.S. Environmental Protection Agency, HQ and Region 2. Contract No.68-C2-0134, Work Assignment #4-353. May 1997.